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Making a recitation schedule

Joseph Bowden



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Making a
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Making a Recitation Schedule

BY

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Making a Recitation Schedule

1. The plan described in this little book makes the work of schedule making almost mechanical and thus does away with many of the worries generally associated with such work. The plan is especially suitable for a small institution, but may be adapted to a large one, as will be explained later (§42). For large institutions however other methods may be more convenient.

Sequences. 2. One of the first things for the schedule maker to do is to divide the hours that may be used for class work into separate groups, preferably so that no two hours of a group come on the same day. I will call these groups **sequences**. The sequence card used for several years at Adelphi College is given below:

Sequence Card

ADELPHI COLLEGE TIME CARD 1 Semester 2										Class { 191	
NAME SURNAME FIRST		191		— 191		Date		91			
Course	9-9 50	10	11	12	1	2	3	4	5		
M	1	5	2		6	8		10			
T	1	3	4		5	7	9	11			
W	2	3	4		6	8	9	10			
Th	1	5			6	7	10	11			
F	2	3	4		7	8	9	11			
1	2	3	4	5	6	7	8	9	10	11	12

The letters in the left hand column stand for the days of the school week; the numbers across the top of the table indicate the recitation hours. Sequence 1 comes at the hours indicated by the figure 1 inside the table, and so on. The vacant hour on Monday at 3 o'clock is left for the faculty meeting and glee club rehearsal, the hour on Thursday at 11 for the general college assembly.

Each course is to be assigned to hours coming all at one sequence. If the courses are all three hour courses, each sequence should contain three hours. If there are some one or two hour courses, they may each be assigned to one or two hours of a three hour sequence. If there are some courses of more than three hours, some of the sequences may be made up of the corresponding numbers of hours or such a course may be assigned to more than one three hour sequence. For the latter purpose it may be convenient, for example, to call a six hour course two courses and to assign one of these hypothetical two courses to

one sequence and the other to another sequence.

3. Just as the hours are grouped into a number of sequences, so it would be convenient if it were possible to arrange the courses into the same number of groups, such that no two courses of the same group should have any common member, teacher or pupil.

This requirement is frequently impossible to realize. Then we try to realize it as nearly as possible, that is, we try to arrange the courses into groups so that any two courses of the same group do not have the same teacher and have as few pupil members in common as possible.

If the number of sequences available is large enough, it is possible to fulfil the above ideal condition exactly, if in no other way, by having one sequence for each course.

A large number of sequences has the advantage, then, of removing conflicts, but the disadvantage of extending the hours of recitation into the late afternoon hours, if that is a disadvantage. A small number of sequences has the advantage of closing the hours of recitation early in the day, but the disadvantage frequently of causing a large number of conflicts, so that many students would hav to substitute for conflicting courses some courses that they do not wish or that ar not so wel suited to the ends they hav in view.

Teachers' Offers. 4. The next thing, possibly the first, for the program maker to do is to get from each teacher a list of the courses he offers for the next semester and a statement of any preferences he may hav for the hours of his courses. For this purpose the following form may be used:

Electiv Blank

ADELPHI COLLEGE

*Will you please fill out the form printed below and return to the
office on or before*

COMMITTEE ON SCHEDULE

Name			COURSES FOR THE 1st 2nd SEMESTER 191 — 191					
			DEPT.	Crs. No. of Course	NAME OF COURSE	Cred. in Pls.	Secs. per Wk.	Lab. per Wk.
MAJ. DIV.	H L M							
INT. DIV.	H L M							
MIN. DIV.	H L M							

1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

The H, L, M in this form stand respectively for History and Philosophy, Languages and Literatures, Mathematics and Sciences, the three divisions into which the courses offered in Adelphi College were grouped, one of which divisions was chosen by each student as a major, another as an intermediate, and a third as a minor.

5. When these blanks are returned to the office, they should be arranged alphabetically according to the names of the teachers. In the upper left hand corner should be placed an abbreviation of the teacher's name, say the first one, two, or three letters of his last name, or some other symbol to represent the teacher.

6. From these blanks a list of all courses offered should be made out in two forms, first arranged alphabetically according to the names of the teachers and second according to the names of departments or subjects, either in one alphabetical list or in as many as there are divisions. The following may be used:

Courses Arranged **1st 2nd**
By **semester**
Teachers **192 -192**

Name of Teacher	Name of Dept.	Department Numbers of Courses			

Courses Arranged 1st 2nd
 By semester
 Departments 192 -192

Name of Dept.	Department Numbers of Courses			

Posting 7. A list of all courses
Courses. offered should then be
Students' posted, or printed and dis-
Electivs. tributed among the stu-
 dents, for which purpose either of the
 latter forms, or a combination of them,
 may be used. From this list the stu-
 dents should make their selections, for
 reporting which the form used for the
 teachers' offers (§4) may be used.

8. When the students' elective blanks have been handed in, they should be numbered, in the upper left hand corner, using say the numbers 1-50 for the seniors, 51-100 for the juniors, 101-200 for the sophomores, 201-300 for the freshmen. If the members of the freshman class are not individually known, we may assign the number 201 to the whole freshman class, or 201 and several following numbers to represent several types of freshmen.

Class 9. After evident errors

Lists. in these blanks have been corrected by the schedule committee, the class lists should be made from them. For this purpose the following form may be used:

CLAS LIST AND CONFLICT STRIP			
Name of Course	Num	Name of Course	Num
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		
7	7		
8	8		
9			
10			
11			
12			
13			
14			
15			
16			
Num of Students	Num of Conflicts		

In this form the small numbers in the left hand column are the students' serial numbers. For the sake of illustration I have imagined a very small college with sixteen students. The large numbers at the right stand for eight courses which are supposed to be offered in our imaginary college. The use of these numbers will be explained later (§18). The left hand margin when filled out as explained below (§§11, 12) will be a **class list**; the right hand margin when properly filled out (§§21-26) will be the **conflict strip** of the corresponding class.

10. Either the students' names should be printed on the form after their serial numbers or the numbers and names should be printed on long strips of paper, using the same sized type and the same spacing as in the form.

11. In making the class lists one of these class list blanks is used for each class. The name of the course is written at the top of each blank as indicated. The blanks are arranged alphabetically according to the names of the classes and are

placed one on top of the other, the blank belonging to the first clas at the bottom, so that only the left hand margins sho, except for the top one, which of course wil be entirely visible, and for the bottom one, of which the left hand colum of numbers should also be visible.

The blanks wil be arranged more accurately in place if they ar laid on a drawing board upon which a line has previusly been drawn to correspond to one of the hevy black lines near the top of the clas list blank. As a blank is laid down, the hevy line on the strip should be made to match the line on the board and the blank should then be secured in place by two thum tacks, one at the top and one at the bottom.

12. To make the clas lists a ruler is laid across the blanks from the middle of the first figure 1 to the middle of the second, the electivs of student number 1 ar red from his electiv blank, and a broken line is drawn **in pencil** as indicated in the following diagram, which supposes that student 1 elects courses Bi. 2, Eng. 2, Hist. 2, and Mus. 2; and so on for each student.

Clas List Table

Bl 1 Name of Course		Bl 2		Eng 1		Eng 2		Hist 1		Hist 2		Mus 1		Mus. 2		CLAS LIST AND CONFLICT STRIP		Mus 2 Name of Course	
Num.																		Num.	
	1																		1
	2																		2
	3																		3
	4																		4
	5																		5
	6																		6
	7																		7
	8																		8
	9																		9
	10																		10
	11																		11
	12																		12
	13																		13
	14																		14
	15																		15
	16																		16
9	Num of Stud	7	8	8	9	7	8	8	8	Num of Students	Num of Conflicts								

In this table each horizontal line indicates the corresponding student's choice of courses and each column represents the clas list of the corresponding course.

13. The clas lists should now be copied by placing a clas list blank beside each of these clas lists in turn and checking the corresponding numbers.

14. The copies should be given to the proper teachers for revision. When the revised lists ar returnd, the originals should be corrected and the lines redrawn in ink, using preferably a ruling pen and making broad lines.

Sections. 15. It may now be decided which courses should not be given and which classes divided into sections. The actual division into sections may be made now, according to any plan, or it may be left to be determind by the students' cards, each student being put into that section which suits his card best. The latter plan wil frequently be found more convenient.

The number of laboratory sections may also be decided upon.

Numbering 16. If the division into
Classes. recitation and laboratory sections is made now, ther should be assignd to each recitation section and to each laboratory section a clas list and conflict strip. The classes and sections should also be numberd in series. For example, if Fysics 1 has two recitation sections and two laboratory sections, these sections may be numberd 71, 72, 73, 74.

If the division into sections is left to be made later, one serial number should be assignd to each clas, but no extra numbers for the sections.

17. We may also assign numbers to courses which for varius reasons, as smallness of classes, it is believd wil not be given. Sometimes it is finally decided to giv such courses. In such case, if a number had not been assignd, we might be obliged to use decimal fractions, or letters, for interpolation, in order to hav the courses numberd in the proper order.

18. The assignd numbers should be enterd, in red ink, above the corresponding numbers in the lists of courses mentiond in §6. They should also be enterd, in red ink, in three places on each clas list and conflict strip, in the two places indicated near the heds of the two colums on the left and right and also in the square to the right of the corresponding black number at the right.

19. The strips belonging to courses which it is believd wil not be given may now be laid aside, to be used later, if it is decided to giv these courses.

Conflicts. 20. We ar now redy to investigate conflicts. Two classes ar said to **conflict** if they hav either the same teacher or one or more pupils in common. Two such classes cannot be placed at the same sequence unless, in case the teacher causes the conflict, another teacher is assignd to one of the classes, or, in case the conflict is due to common pupils, these pupils choose between the two courses.

21. Arrange the clas lists again as in the table of §12. Take the first clas list from the bottom of the pile and lay it alongside of each other clas list in turn. It is then easily seen whether clas 1 and any other clas, say clas 2, hav any pupils in common, and, if so, how many, and which ones.

If they hav none, rite an "0" with ink in the blank conflict strip of the first clas in the square oposit 2.

If they hav more common members than the greatest number of conflicts that would be allowd, say 5, rite a check mark "✓" with ink in the square.

If they hav less than 5 common members, we may follow either one of two plans. We may rite in the square with pencil the number of common members, or we may rite with ink the ordinal numbers of the common members. The latter plan takes more time, but wil frequently save time in the later work, since we frequently want to kno not only how many common members two classes hav, but who these conflicting members ar.

In this way all the squares of the blank conflict strip of clas 1 will be fild, starting with the square opposit 2.

In the same way all the squares of the second blank conflict strip, starting with the square opposit 3, may be fild. And so on.

22. Of course, if two classes hav the same members, their conflicts with the other classes wil be the same. It wil not therfor be necessary to compare them both with the other classes. The squares of the second's blank conflict strip may be fild by copying from the first's strip.

23. As the blanks ar fild out, lay them in a pile with the first at the top and the conflict strips showing, as indicated on the next page:

24. We may now very easily enter in this table the conflicts due to teachers. If teacher A has courses 1, 2, 3, 4, an "A" should be entered in squares 2, 3, 4 on blank 1, in squares 3, 4 on blank 2, and square 4 on blank 3. Similarly for the other teachers.

25. The blanks now constitute as laid together half of the conflict table. Since the conflicts of one clas with a second ar the same as those of the second with the first, this table should be symmetrical about the principal diagonal, the line of red figures running from the upper left hand corner to the lower right hand corner.

The blank squares of the first ro may therfor be fild by turning the first conflict strip around thru a right angle and laying its squares alongside of the first ro of squares. The blank squares of the second ro may similarly be fild by using the second conflict strip, and so on.

26. The number of different courses that each course conflicts with should now be counted up and entered in the square at the bottom of the corresponding conflict strip. These numbers may be called the **conflict coefficients**. A course whose conflict coefficient is large is in general harder to arrange for on the schedule than one whose coefficient is small. The courses with largest coefficients should therefore be provided for first.

27. If the conflict strips are now again arranged as in §23, altho this is not necessary for our purpose, they will form the completed conflict table, which will look as follows:

28. It may be wise now to make a vertical list of the courses on one sheet of paper, arranging the courses according to the magnitude of their conflict coefficients.

Assigning Courses to Sequences. 29. The object now is to arrange the courses in groups, such that the courses of each group do not conflict with each other, or conflict as little as possible, and to assign these groups to separate sequences. All of our previous work has been done in order to make this work as easy as possible.

Probably the best plan is to cut the conflict strips from the completed class list and conflict strips. Place the class lists aside.

If the division into sections has been left to be determined by the students' cards (§15), the conflict strip belonging to a class which is to have sections should now be assigned to recitation section 1 and another conflict strip should be made out for each other recitation section and laboratory section by copying from this strip.

The conflict strips should be placed side by side on a table, arranged according to the magnitude of their conflict coefficients.

Now take as many blank clas list and conflict strips as ther ar sequences and from each of these cut out the strip containing the list of course numbers. Number these strips to correspond to the sequences, say from 1 to 12. We wil call these strips, so numberd, the **sequence gides**. Spred the sequence gides out on a table, leaving spaces between to represent the sequences.

30. We may next assign certain courses or sections arbitrarily to the sequences, not more than one to each, these courses or sections being ones which for varius reasons it seems should be set at definit places on the program. The corresponding conflict strips should be placed beside the proper sequence gides.

31. Now take up the conflict strip belonging to that one of the unassignd

courses or sections whose conflict coefficient is greatest or one of the greatest. Say this is course 9. By running the eye along the 9th row of squares on the strips belonging to the courses already assigned it can generally be easily seen at which sequence course 9 should be placed to cause the least number of conflicts. Place this conflict strip in the space representing this sequence.

If there are several equally available sequences, it is usually best to put the course at the sequence coming earliest in the day. Or this course can be left to be assigned after the course having the next highest conflict coefficient.

We may continue in the same way until all the courses and sections have been assigned to sequences, the conflict strips for each sequence being arranged in numerical order.

32. If it happens that about the same number of conflicts will be caused by assigning a course to either of two different sequences, it may be advisable to consider who are the students that

cause the conflicts. One student may find it easy to change his electives, another may find it hard.

If the conflict table was made according to the first plan mentioned in §21, it will now be advisable to reconstruct a part of it according to the second plan. Suppose that courses 2, 4, 5, and 7 are already assigned to a certain sequence and we wish to find what conflicts will be caused by putting course 6 at this sequence. We compare class list 6 again with class lists 2, 4, 5, and 7 and write with ink the ordinal numbers of the students causing the conflicts in the corresponding squares of the conflict strips 6, 2, 4, 5, 7 in place of the numbers originally put in these squares.

33. When a class is assigned to a sequence, corresponding entries should be made, in pencil, in the **course sequence form of schedule**, the **sequence room schedule**, and on the teacher's **hour time card**.

The form for the last of these may be the same as that given for the sequence

34. The sequence room schedule differs from the course sequence form of schedule in having inserted in the squares of the left hand margin the numbers of the rooms insted of the names of departments. In the interior squares should be placed the names of the teachers (or classes) occupying the varius rooms at the varius sequences.

35. After all courses hav been assignd to places it wil frequently be found that certain courses hav more conflicts than when first assignd to places. The conflicts hav been heaping up as the time table grew. It wil be wise to consider each course over again, to see if, by changing its assignment, the number of conflicts cannot be reduced. Frequently, when one course has its assignment changed, an opening is made by which we may improve the assignment of another course. The opening, if any, is of course in the sequence from which the first course has been removed. While making these changes, also, the teachers' cards should

be studied, to see if they cannot be improved.

36. It will be wise now to enter the electivs chosen by the students in the **sequence strips** at the bottoms of their electiv blanks. If these electiv blanks ar arranged one above another leaving the sequence strips exposed, it wil sometimes be evident that one clas, senior, junior, sofomore, or freshman, has been favord more than the others with early hours. Sometimes a change can be made so as to remove the inequality.

Sequence	37. These sequence
Time	time cards of the students
Cards.	may also be used in inves-

tigating what course a student had better be advised to take in place of one of two conflicting courses.

38. They may also be used, with the sequence time card of the teacher, to determin the best place for some new course which it may hav been decided to giv.

Forms of Schedule 39. The time table is now complete and exists in several forms. It may also be put into several other forms convenient for use, one of which follows:

Unary Form semester
of Schedule 192 -192

HIST AND FIL				LANG AND LIT				MATH AND SI			
Course	Seq	Tchr	Rm	Course	Seq	Tchr	Rm	Course	Seq	Tchr	Rm

40. From the schedule in the above form it may be wise to pick out the courses open to freshmen and with these make a **freshman schedule** in the same form.

41. Sometimes tables showing what courses come at the various hours of the week and what teachers occupy the various rooms at the various hours of the week are useful. These of course can be compiled from the other tables.

Large Institutions. 42. The plan described in this book would be unwieldy for a large institution. But it might be applied by artificially dividing the large institution into several small ones.

The time table might be made up first for a certain group of students, say those whose chief work is in science. Then another group of students would be considered, the courses that they have in common with the first group being considered as fixed in place.

The first group to be considered might be the senior class, the second the junior class, etc.

43. The work may also sometimes be simplified by considering instead of individual students groups of students whose work is the same. A single number could represent such a group.

Examination Schedule. 44. It will be evident that the same method may be applied to making an examination schedule, or the examination schedule can be made up from the recitation schedule.

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